E C O T O X

ECOTOXicology Database System

Data Field Descriptions

Prepared for

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Office of Research and Development
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WARNING

Researchers and managers using ECOTOX for analyses or summary projects should consult the original publication. This will ensure an understanding of the context of the data retrieved from ECOTOX.

ECOTOX attempts to be comprehensive, but due to funding gaps, data from recent publication years may not appear in the database. Researchers should conduct literature searches for additional relevant data to supplement ECOTOX retrievals for terrestrial data.

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INTRODUCTION

In the development and implementation of ecosystem management decisions, there is the need to establish scientifically credible risk assessments for chemical stressors. Ecological assessments are required to characterize and diagnose the relative risk of chemical pollutants and to predict future risk as a function of environmental management options.

ECOTOX (ECOTOXicology Database System) is a comprehensive computer-based system that provides single chemical toxic effect data for aquatic life, terrestrial plants, and terrestrial wildlife. This data is useful in developing consistent ecosystem management decisions within EPA and other Federal, state, local, tribal and international governmental agencies. ECOTOX provides a means to cost-effectively collect standardized and critically needed effects data for a wide variety of ecological risk assessments.

ECOTOX, developed at the U.S. EPA MED-Duluth, integrates three previously independent databases - AQUIRE, PHYTOTOX, and TERRETOX - into a unique system which includes unique toxicity data derived predominately from the peer-reviewed literature, for aquatic life, terrestrial plants, and terrestrial wildlife, respectively. The U.S. EPA Office of Pesticide Program's Environmental Effects Database (EEDB) toxic effects data for registered pesticides is also included within ECOTOX. Not all data published in the peer review ecotoxicology literature are included in ECOTOX. You should refer to the Limitations section of this document to understand test results that are not considered for inclusion in the database.

AQUIRE, the aquatic toxicology database was developed in 1981. The aquatic toxicity data compilation spans the publication years from 1915 through to the present time. Retrieval, review, and encoding of terrestrial plant toxicology literature into PHYTOTOX began in 1981. Data are available from the publication year 1926 through to the present time. Terrestrial animal toxicology literature has been retrieved, reviewed and entered into TERRETOX since 1983. Data are available from the publications year 1969 to the present time.

The Pesticide Ecotoxicity Database (formerly Ecological Effects Database), U.S. EPA Office of Pesticide Programs, is integrated into ECOTOX via periodic updates from the Office of Pesticide Programs. The Pesticide Ecotoxicity Database includes toxicity data for aquatic and terrestrial life. These data have been reviewed and categorized as acceptable for fulfillment of pesticide registration and re-registration guideline requirements as explained under FIFRA Subdivision E, Parts 158.145 and 158.150.

Researchers or managers using ECOTOX for analyses or summary projects should consult the original scientific paper to ensure an understanding of the context of the data retrieved from ECOTOX.

For more information on the ECOTOX database contact:

Scientific Outreach Program
U.S. Environmental Protection Agency
Office of Research and Development
National Health and Environmental Effects Research Laboratory
Mid-Continent Ecology Division (MED-Duluth)
6201 Congdon Boulevard
Duluth, Minnesota 55804
Telephone: 218-529-5225
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E-mail: ecotox.support@epa.gov

The ECOTOX database can be accessed using your web browser software via the Internet at http://www.epa.gov/ecotox/.

For more detailed information regarding field data definitions, refer to the coding guidelines for the aquatic database (Aquatic Coding Guidelines) and the terrestrial database (Terestrial Coding Guidelines) available in PDF format on the ECOTOX web site.

ECOTOX DATA ELEMENTS

Data Sources

The primary source of toxicity effect information in ECOTOX is the peer reviewed literature. Pertinent literature is identified through online computerized searches of the international literature. The computerized searches were initiated with the 1970 publication year and continue through to the present. Comprehensive searches are designed to include the effect of nearly all toxic substances on aquatic and terrestrial organisms within the scope of the each ECOTOX database systems' guidelines. Commercial literature sources are continually evaluated for relevance to the ECOTOX literature searches. The search strategy is evaluated regarding the success ratio of each search. Additional literature sources include abstract journals, review bibliographies, and the EPA MED library collection.

The abstracts obtained through computerized searches of abstracting databases are screened to identify toxicity references applicable to aquatic and terrestrial habitats. Those references pertinent to one or more of the databases are acquired through a variety of literature acquisition procedures such as author reprint requests, inter-library loans, and commercial sources. As the publications are received, a reference number is assigned for storage and retrieval purposes, and a final check for applicability and duplication is made. A bibliographic sub-file stores the citations and a reprint of each publication is archived.

Publications used in ECOTOX usually contain unique data. Toxicity test data are included unless the data have been cited as published elsewhere. Data reported in review papers are abstracted from the original publication. International publications are reviewed by ECOTOX staff if either an English abstract or a translated table of data is included. International cooperative efforts are underway with the Organization for Economic Cooperation and Development (OECD) and Russia (Borok Institute) to enhance review of the international literature.

Data obtained from independently compiled data files must meet the minimum data requirements and quality assurance guidelines defined for each ECOTOX database component. The key data fields that must be included are: test chemical name, test organism, test duration, effect, and effect concentration or application rate. Table 1 outlines the minimum data requirements for each ECOTOX database.

Table 1: ECOTOX Minimum Data Requirements

Requirement	AQUIRE	PHYTOTOX	TERRETOX
Chemical	Single chemicals relevant to environmental exposure	Single chemicals relevant to environmental exposure	Single chemicals and oils relevant to environmental exposure.
Species	Exclusively aquatic plants and animals	Terrestrial plants	Air-breathing animals (e.g., includes ducks, whales)
Effect	Biological effect on live organisms	Biological effect on live organisms	Biological effect on live organisms
Concentration or Dose Value	Must have concurrent environmental chemical concentration/dose	Must have concurrent environmental chemical concentration/dose	Must have concurrent environmental chemical concentration/dose
Exposure Duration	Duration required, except for abstracts	Duration not required	Duration required
Concentration or Dose/ Response	Endpoints hierarchically coded. Non-statistically analyzed and qualitative data may be summarized by effect into one test.	Since February, 2000, all endpoints and individual quantitative dose - response data.	All endpoints and individual quantitative dose - responses data.

Documentation describing the test methods must be provided within the publication. If tests are missing key parameters, the data are rejected. No effort is made to locate unreported data (e.g., authors are not contacted, citations referring to methods used are not obtained). During the incorporation of an electronic data file, a quality assurance check of the CAS number, species scientific name, and reference citation is completed. Data files that have been included in the aquatic dataset are the MED fathead minnow acute toxicity database (Center for Lake Superior Studies; University of Wisconsin-Superior, 1984, 1985, 1986, 1988, and 1990), and data sets from France, Germany, the Netherlands and Russia. ECOTOX also includes the U.S. EPA OPP's Pesticide Ecotoxicity Database for both aquatic and terrestrial toxicity tests. Appendix B contains additional information and contacts for independently compiled data files.

Quality Assurance

Quality assurance procedures begin with literature acquisition and cataloging, and continue through the chemical and species verification, the literature review process, data entry, and data retrieval. The ECOTOX literature is encoded by trained document abstractors. An intensive training period, a well-documented manual (U.S. EPA 1999), and close interaction with the data coordinator help to ensure a high level of accuracy and consistency in the reviewing process. Ten percent of the publications are independently

reviewed by two different reviewers. These reviews are compared, differences (if any) are documented, discussed, and resolved by the data coordinator.

Chemical Verification

A standardized identification number and name for each chemical recorded in the database is used for consistency. Chemicals reported in the ECOTOX database are cataloged by using a Chemical Abstracts Service (CAS) registry number. If a CAS registry number is not available for the test chemical, toxicity data cannot be included in ECOTOX. Toxicants not included in ECOTOX are water chemistry effects (e.g., pH), complex effluents and chemical mixtures. If the author states that a soil nutrient is added to maintain test organism growth, the test is included. If the test includes a series of nutrients doses and a toxicant to produce interactive effects, this is considered a mixture and excluded.

Retrieval is made by using the CAS number, chemical name or chemical list. The Collective Index (CI) name is used as the standardized name for storage and retrieval. A separate index file is available for screening CAS numbers and chemical names used in ECOTOX. It is important to stress that you refer to the original publication to obtain additional test chemical information which may affect the context of toxicity information retrieved from ECOTOX.

Species Verification

The test organism is identified by the current scientific name as verified in the taxonomic literature. For each species entry, the verified name, taxonomic kingdom, nomenclature history, and verification sources are kept on file for documentation purposes. A species number can be located using the species scientific name or common name. ECOTOX retains all species name synonyms that are no longer used for taxonomic classification. These synonyms are identified within the scientific name file by a trailing 'Historical name' after the scientific name. You are able to search in ECOTOX using the species synonym name, however, your output will contain the currently accepted species name. Taxonomic kingdoms are divided into plant (including fungi and monera) and animal kingdom.

Field studies may report results for a target community (e.g. benthic macroinvertebrates) or for an entire enclosed ecosystem (e.g. system-level primary productivity or respiration). If a community of organisms was tested, the species grouping from the publication is reported.

Reference Citation

Each publication is catalogued in a verified bibliographic citation data file. The author, publication year, title and source are provided for you to locate the publication using your

library service.

ECOTOX SEARCHABLE FIELDS

Endpoint

Endpoint information is coded if it is reported by the author. For the purposes of ECOTOX, an endpoint is defined as the quantification of an observed effect obtained through statistics or other means of calculation for the express purpose of comparing equivalent effects (e.g., LC50). Many terrestrial plant tests do not have associated endpoints. Prior to 1996, terrestrial plant database structure allowed only results based on percent change from control. View the Endpoint Code List for specific endpoint codes and definitions.

Effect Group/Effects

Effect information must be provided by the author in order for the test to be included. For ECOTOX database purposes, effect is defined as the observation of a response resulting from the action of a chemical stressor (e.g., mortality). The listing of effect measurements can be found by using the Browse Effects index, ECOTOX Code List or ECOTOX Code Appendix (includes many detailed measurement definitions). ECOTOX internally categorizes all observed effects under at least one of ten major effect group codes:

EFFECT GROUP	DEFINITION
Accumulation (ACC)	Process by which chemicals are taken into and stored in the organism. Includes lethal body burden.
Behavior (BEH)	Activity of an organism represented by three subgroups, avoidance (AVO), general behavior (BEH) and feeding behavior (FDB). All effects related to reproductive behavior are listed under the Reproduction effect group.
Biochemistry (BCM)	Biotransformation or metabolism of chemical compounds, modes of toxic action, and biochemical organism responses. Biochemical has three subgroups, biochemical (BCM), enzyme (ENZ) and hormone (HRM) effects.
Cellular (CEL)	Changes in structure and chemical composition of cells and tissues in organisms. Three cellular subgroups include cellular (CEL) effects, genetics (GEN) and histology (HIS).

EFFECT GROUP	DEFINITION
Growth (GRO)	Encompasses individual organism weight, length, development and morphology. Development (DVP) covers effects on tissue organization in growing early life stages. Growth (GRO) represents length and weight changes at any point in the life cycle. Morphology (MPH) measurements and endpoints address the structure (bones) and form (organ/tissue development) of an organism at any stage of its life history.
Mortality (MOR)	Death of individuals or measurements that indicate death.
Physiology (PHY)	Basic cell and tissue activities. Subgroups include injury (INJ), immunity (IMM) and intoxication (ITX).
Population (POP)	Effects on species or taxonomic group occupying the same area at a given time.
Reproduction (REP)	Reproductive behavior, physiology, care of progeny and avian/reptile eggs (AEG) measurements. Offspring development effects are found in Growth effect group.
Ecosystem (PRS)	Ecosystem processes include community structure and function. Includes microbial processes.
No Group Code (NOC)	Multiple effects or endpoint lacking a specific effect.

Documentation Code

The ECOTOX documentation code indicates the type and completeness of method and result documentation accompanying the data. Documentation code assignments range from detailed documentation to summary format. The documentation codes are summarized below. Although a documentation code of 'C' does not signify that these test data are better than test data receiving a documentation code of I, it does give ECOTOX users a means of determining the level of confidence associated with that test record. You may view the detailed scoring method for documentation codes in the ECOTOX Code List.

Documentation Code = C: Thorough methods and results documentation.

Documentation Code = M: Documentation is generally satisfactory, but one or more of the pieces of information are missing from either the methods or results section such as control information or chemical concentrations are unmeasured.

Documentation Code = I: Insufficient methods and results documentation.

AQUATIC DATA ELEMENTS

Aquatic data includes toxic effect results from exposures of single chemicals to aquatic

organisms. Bioassays not included are water chemistry effects (e.g., pH), complex effluents, sediment studies that do not report a water concentration and chemical mixtures. If a publication contains data for a single chemical besides one of the above categories of toxicants, the paper is retained and only the single chemical data are used in ECOTOX. Test organisms are limited to those that are exclusively aquatic. Amphibian and insect data for purely aquatic life stages of the organism are included. Information and data for terrestrial life stages of these organisms is included in the terrestrial database. Classes of organisms associated with the aquatic environment (e.g., birds, mammals, reptiles) are coded in the terrestrial database. Microbial communities (bacteria and virus) are omitted from the aquatic database. Terrestrial plants tested in hydroponic or nutrient solutions are coded in the terrestrial database.

The data elements for each test are grouped by chemical, organism, exposure conditions, and effect endpoint. The test chemical parameters describe the toxicant, the associated CAS registry number, and the grade, purity and/or composition of the toxicant. The test organism parameters define the type of organism and the lifestage being tested. The test conditions identify the test water, test location, exposure type and duration, control parameters, and basic water chemistry. The effect endpoint parameters consist of a code to define the lethal, sublethal, or residue endpoint and the corresponding test chemical concentration.

If the author did not report data for an aquatic database field, the web browser report will display a blank field. The export output field will store an “NR”.

Aquatic Chemical Fields

Field Name	Field Definition	Field Type/ Additional Help
CAS Number	Chemical Abstracts Service Number	Browse Chemicals
Chemical Name	CAS Collective Index Name	Browse Chemicals
Chemical Grade	Grade name	View **Grade** Code List
Chemical Purity	Percent purity or active ingredient	Percent Value
Chemical Comment	Chemical formulation code, trade names, synonyms, isomers	View **Chemical** Code List

Aquatic Species Fields

Field Name	Field Definition	Field Type/ Additional Help
Species Number	Unique number assigned by ECOTOX software.	Browse Species

Field Name	Field Definition	Field Type/ Additional Help
Species Scientific Name	Currently accepted scientific name	Browse Species
Species Common Name	Species or taxonomic grouping common name(s)	Browse Species
Organism Comment	Initial age, weight, length, developmental stage or cell concentration of test organism.	Text field
Kingdom (Quick) Species Type (Advanced)	Divides all species into two kingdoms (plant or animal). The plant kingdom includes Monera and Fungi species. A taxonomic group (e.g., aquatic community, plankton) that has both plant and animal kingdoms into one result are included in both plant and animal kingdom search.	Search option only. Not an output option.

Aquatic Test Condition Fields

Field Name	Field Definition	Field Type/ Additional Help
Media Type	Freshwater (FW) tests include those 1) conducted in freshwater, reconstituted water, distilled water, or tap water or 2) the organism habitat is exclusively freshwater. Saltwater (SW) tests include those 1) conducted in natural or artificial seawater, brackish water, or estuarine water or 2) the organism habitat is exclusively saline. If a salinity value of $\leq$ 4 parts per thousand is reported, it is considered a freshwater test.	View **Media Type** Code List
Test Location	A natural (Field N) study is an experiment conducted outdoors in a natural water body or in an artificial water body that has a natural bottom substrate and established aquatic communities (e.g. phytoplankton, zooplankton and fish). Outdoor studies conducted in an artificial water body without a natural bottom substrate are considered artificial studies (Field A). If the water body cannot be determined to be natural or artificial it is coded as field unknown (FieldU). All other studies are considered laboratory (LAB) tests.	View **Test Location** Code List

Field Name	Field Definition	Field Type/ Additional Help
Exposure Duration	Exposure duration is coded using the units reported in the literature. For a fluctuating or intermittent dosing experiment, the total exposure time is recorded. For delayed effects, report the duration of exposure to the toxicant only.	View **Exposure Duration** Unit Codes
Exposure Type	Exposures must either be aqueous, through the diet, or by injection. *In vitro* toxicity test results are not coded in the aquatic database.	View **Exposure Type** Code List
Chemical Analysis Method	Quantitative analysis of water in test chambers or field sites are considered a measured concentration. Concentrations that are not analyzed in test chambers or field sites are considered unmeasured (nominal).	View **Chemical Analysis Method** Code List
Study Type	The study type is used to identify field simulation studies. Examples of field study types include exposures conducted in a mesocosm, microcosm or enclosure.	Text field
Control Type	Control information for the reported effect may be presented in the text, in a graph, or in table format. ECOTOX does not make assessments whether the controls were satisfactory or insufficient (e.g., were replicates run, did control organisms die), but simply document whether the author(s) present information about the type of control that was used.	View **Control Type** Code List
Experimental Design	This field is used to code additional study information. For field tests, exposure system dimensions (e.g. pond or lake depth, cage or enclosure size), type of artificial substrate and physical or chemical water chemistry parameters are reported. For laboratory studies, information about media and test chambers is coded if one of the purposes of the study is to compare results observed under differing test conditions (e.g., pH, temp, humic acid, sediment) or if commercial media types (e.g. Instant Ocean©) were used in the study.	Text field

Aquatic Effect Parameters

A separate line is coded for each effect or endpoint from either a unique experimental design or within one design scenario for statistically defined effects or endpoints. If no statistics are used to distinguish endpoints or effects and experimental designs are similar the data may be combined into one data record. Endpoints always require a discrete line. Emphasis is placed on coding LC50, LD50, EC50 over other regression analyzed endpoints (e.g., EC20, LC100, LD10) when an author reports both endpoints. Effects lacking an author reported endpoint may be combined based on statistical representation by the author. Food chain effects are coded for organisms at the first level of exposure.

Toxicity test results are primarily reported for observations taken during the chemical exposure. However, when results are reported only for the period of time after the exposure, i.e. recovery or delayed effects, this type of result is noted by using a "~" in conjunction with the endpoint/effect code, e.g., ~MOR for a delayed mortality effect.

Aquatic Effect Fields

Field Name	Field Definition	Field Type/ Additional Help
Trend	The observed or measured response trend as compared to the control is coded when textually or graphically reported.	View **Trend** Code List
Response Site	A response site or tissue code is used to identify specific body, organ or tissue effect sites for associated effect measurement.	View **Response Site** Code List
EE_Comment	This field contains additional endpoint and/or effect text as described by the author. The types of information coded are described in the Aquatic Coding Guidelines	Text Field
Effect %	Effect is reported as a raw percent value or percent change, e.g., percent of the total population or percent increase or decrease.	Percent Value
Significance	Statistical analysis as compared to the controls in the test result.	View **Significance** Code List

Field Name	Field Definition	Field Type/ Additional Help
BCF Value	The bioconcentration factor (BCF) is a unitless value describing the degree to which a chemical can be concentrated in the tissues of an organism in the aquatic environment (View Endpoint Code List for full definition). A bioconcentration endpoint is coded as either wet (or unknown) or as dry weight (BCF and BCFD, respectively). An accumulation effect is coded. If the author does not calculate a BCF, the test is recorded as a residue measurement effect with a blank Endpoint and BCF field. If a BCF is reported for the parent compound and for a metabolite, the parent compound BCF. Additional information about the BCF is reported, e.g., steady state equilibrium, lipid normalization is noted in the EE_Comment field.	BCF Value
Concentration Type	Concentrations based on the active ingredient or formulation, or as the total, un-ionized or dissolved concentration, are identified.	View **Concentration Type** Code List
Effect Concentration	The effect concentration is expressed in µg/L. The confidence interval or range is recorded when available. If the concentration is reported in units which cannot be readily converted into µg/L (e.g., mg/kg or µCi/L), the concentration value and its units are recorded. If an asterisk (*) denotes the concentration has been recalculated from the author's original units to the standard ug/L or from the metal compound to the active ionic form. In certain cases, the water concentration is routinely reported as active form of the test chemical. For metal salts, the concentration is generally expressed as ug ion/L (e.g., HgCl is expressed as Hg^{+}). The aquatic data does not distinguish between the metal compound and the metal ion. When an exponential number is reported (e.g., 1 x 10^{6}), it is coded as E+n or E-n (e.g., 1 E+6).	View **Concentration Unit** Code List

Aquatic Water Chemistry Fields

Field Name	Field Definition	Field Type/ Additional Help
Alkalinity	Expressed as mg/L as $CaCO_3$.	These measured values pertain either to the test water chemistry (preferred) or the dilution water chemistry values. If it is necessary to report the dilution water chemistry, this is denoted by an asterisk (*).
Conductivity	Expressed in µmhos/cm (=µs/cm).	
Dissolved oxygen	Expressed in mg/L or percent saturation. A "SAT" code denotes 100% saturation.	
Hardness	If the author only reports the terms "hard" or "soft", these terms are recorded	
Organic Carbon Type and Value	Expressed in mg/L as Carbon. (T= total, P= Particulate, D= Dissolved) View **Organic Carbon Type** Code List.	
pH	pH value	
Salinity	Expressed in parts per thousand (ppTH) or as percent seawater.	
Temperature	Expressed in degrees Celsius.	

Aquatic Outdoor Test Fields

Field Name	Field Definition	Field Type/ Additional Help
Habitat Code	The aquatic field tests include the Cowardin* system level classification to describe major aquatic systems.	View **Habitat Code** List
Habitat Description	The author's description of the water body, (e.g. brackish marsh, wooded swamp)	Text field
Substrate	The bottom substrate is recorded using standard substrate definitions. Otherwise, it is recorded as the author states in the literature.	View **Substrate Code** List
Water Depth	Water depth is coded for the study site, as reported by the author.	View **Water Depth Unit** Code List
Geographic (GEO) Code	The standardized name, based on FIPS (Federal Information Processing Standards) code, of the country, or United States and Canadian state/province where the test was performed is displayed.	View **FIPS** documentation at: http://www.nist.gov/itl/div897/pubs/fip10-4.htm
Geographic Location	Contains general text about the test site specific geographic identifiers (e.g., lake, river, bay, field station or city) where the study was performed.	Text Field
Longitude/Latitude	If reported by the author, the latitude and longitude are stored.	Text Field
Application Type	This code reports the method of application of the chemical.	View **Application Type** Code List
Application Frequency	The number of doses applied during the exposure is reported.	View **Application Frequency** Code List
Application Rate	This field contains the application rate value and the units that the author reports. If an exposure concentration is not reported by author, the application rate must be reported. Application rate units can be recalculated only if the denominator is not equal to one (e.g. 5 g/2.5 ac).	View **Application Rate Unit** Code List
Chemical Half-Life	The chemical half-life in water is recorded.	Text Field

Field Name	Field Definition	Field Type/ Additional Help
Application Date/Season	The application date is recorded the time of initial exposure. This field includes the actual date, a partial date or a season. The format is MO-DA-YR. Examples: 12-01-93, 01-00-75, 00-00-64. If one pond is exposed multiple times, only report the first application date. If the calendar year date is not reported, but a season is, the season (Northern Hemisphere) of initial application of the chemical is reported.	View **Application Season Code** List

* Cowardin, L.M., V.Carter, F.C.Golet and E.T.LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* U.S. Fish and Wildlife Service, FWS/OBS-79, 31 p. (http://www.nwi.fws.gov/contents.html/)

TERRESTRIAL DATA ELEMENTS

Toxicity data includes toxic effect results from exposures of single chemicals to terrestrial organisms. The terrestrial toxicity database includes individual dose response values, if reported. Only quantitative data are encoded from the publication, qualitative data are excluded. Graphical data may be coded as ranges and is reported by using <, > or ~ operators with the value.

Bioassays not included are contaminated soils, sediment studies and chemical mixtures. If a publication contains data for a single chemical besides one of the above categories of toxicants, the paper is retained and only the single chemical data are used in ECOTOX. Test organisms are limited to those that are exclusively terrestrial. Microbial communities (bacteria) are included only for specific chemicals of concern.

The data elements for each test are grouped by chemical, organism, exposure conditions, and effect endpoint. The test chemical parameters describe the toxicant, the associated CAS registry number, and the grade, purity and/or composition of the toxicant. The test organism parameters define the type of organism, organism source and the lifestage being tested. The test conditions identify the, test location, exposure type and duration, control parameters, and basic soil parameters. The effect endpoint parameters consist of a code to define the lethal, sublethal, or residue endpoint and the corresponding test chemical concentration.

If the author does not report data for a terrestrial database field, the field will display a “NR’ (not reported).

The terrestrial data identifies sources of alternative data (domestic, laboratory animal or plant toxicity and bioaccumulation information) when there is a paucity of information on wildlife species. Animals associated with the aquatic environment that breathe using gills (e.g., ducks, whales) are included in the terrestrial database. Exposures to the aquatic life stages of amphibians and insects are included in the aquatic database.

Decisions regarding the inclusion of animal terrestrial species are based on published terrestrial wildlife toxicity standard methods and procedures documentation. The priority for the animal portion of the database is wildlife avian species, e.g. mallard, pheasant or bobwhite; mammalian species, e.g., meadow vole, deer mouse or mink; and beneficial invertebrate species, e.g., earthworm, honey bee, leafcutter bee or alkali bee. If data for other species including laboratory, domestic or non-beneficial organisms are reported in a publication, data for all test species are coded for ECOTOX

Terrestrial plant data includes native, crop, or weed species. Terrestrial plants tested in hydroponic or nutrient solutions are coded in the terrestrial database. Aquatic plant

exposures are recorded in the aquatic database.

Fields lacking data are noted in the terrestrial reports as NR (Not Reported).

Test Identification

Test identification number is used to designate each unique test design. A unique test design may be characterized by a new test chemical, test species, test location, or exposure type. Additionally, there are experimental design parameters that will influence a test scenario sufficiently to warrant an independent test record. Such parameters include tests conducted at different test temperatures or conducted during different seasons.

Field Name	Field Definition	Field Type/ Additional Help
Test Number	A computer generated number that designates each unique test design. There can be many tests number for each reference number	
Exposure Number	A sequential number and dose type that identifies each experimental control or dose level. Control values are given the lowest numeric values, the dose values are added sequentially from lowest to highest doses. Example: 1C = Exposure 1 was the control value 2D = Exposure 2 is the lowest dose value 3D = Exposure 3 is the middle dose value 4D = Exposure 4 is the highest dose value 5R = The exposure values are ranged (low - high) 6E = Only endpoint data are presented in the results. The exposure dose(s) in the experimental methods are coded, even if the author did not report an effect result for every dose.	See **Dose Type** Code List.
Result Record Number	A computer generated number that uniquely identifies each results record. There can may many result record numbers for each test number.	

Terrestrial Chemical Fields

Field Name	Field Definition	Field Type/ Additional Help
CAS Number	Chemical Abstracts Service Number	Browse Chemicals
Chemical Name	CAS Collective Index Name	Browse Chemicals
Chemical Grade	Grade name	View **Grade** Code List
Chemical Purity	Percent purity or active ingredient	Percent Value
Chemical Formulation	Formulation of chemical	View **Formulation** Code List
Chemical Comment	Chemical formulation code, trade names, synonyms, isomers	Text Field

Terrestrial Species Fields

Field Name	Field Definition	Field Type/ Additional Help
Species Number	Unique number assigned by ECOTOX software.	Browse Species
Species Scientific Name	Currently accepted scientific name	Browse Species
Species Common name	Common name(s)	Browse Species
Organism Source	The type of source the test organism was obtained	View **Organism Source** Code List
Lifestage	Initial test organism lifestage	View **Lifestage** Code List
Organism Age	Initial age of the test organism	View **Age Unit** Code List
Organism Comment	Initial weight, length or cultivar(cv)/variety (var)/hybrid of the test organism.	Text field
Kingdom (Quick) Species Type (Advanced)	Divides all species into two kingdoms (plant or animal). The plant kingdom includes Monera and Fungi species. A taxonomic group (e.g., soil community, plankton) that has both plant and animal kingdoms into one result are included in both plant and animal kingdom search.	Search option only. Not an output option.

Terrestrial Test Condition Fields

Field Name	Field Definition	Field Type/ Additional Help
Media Type	Type of exposure media, (e.g., natural or artificial soil, hydroponic, filter paper). If an aqueous exposure is conducted in pore water from a specific soil, report the soil parameters in the soil characteristics fields (pH, CEC, OM, etc.).	View **Media Type** Code List
Test Location	The location or setting in which the experiment was conducted. For example, a natural field study (FieldN) is an experiment conducted outdoors in a natural setting. The test organisms are sampled in the wild, e.g. population counts. Outdoor studies conducted in a simulated environment are coded as an artificial field study (FieldA). Artificial field studies include organisms isolated from their natural environment via an enclosure of some type, e.g. cages or fencing. If the publication does not provide enough information to distinguish between FieldA and FieldN, then use the code FieldU to indicate that the field test type is unknown. Laboratory tests (LAB) are conducted indoors under controlled laboratory conditions.	View **Test Location** Code List
Exposure Duration	The period of time recorded in the data field is the time of actual exposure to the chemical. It is assumed that the exposure duration is equivalent to the longest observation time. In some cases a biological time is used, such as an exposure time reported as “until hatch”, “growing season” or “after the nth egg has been laid”. For injection, diet, topical and environmental exposures where the actual exposure is dependent on biological and environmental conditions, the exposure time is recorded as equivalent to the study time.	View **Duration Unit** Code List

Field Name	Field Definition	Field Type/ Additional Help
Study Duration	In cases where the observation time is the only duration reported, it is assumed that the exposure duration is equivalent to the study time. In some cases a biological time is used, such as an exposure time reported as “until hatch”, “growing season” or “after the nth egg has been laid”. Use the code from Appendix I that best describes the author's words.. For injection, diet, topical and environmental exposures where the actual exposure is dependent on biological and environmental conditions, the exposure time is recorded as equivalent to the study time.	View **Duration Unit** Code List
Exposure Type	The mechanism by which the toxicant was applied. Organisms are typically exposed to toxicants through diet, injection, inhalation, topical or environmental routes. On occasion, an exposure may be through multiple routes (e.g., such as topical and oral). The terrestrial databases does not include in vitro assays in the database. Exposure types are searched by major exposure groups. However, a more specific exposure type is displayed in your output (e.g., searching on Intercutaneous is found under the Injection exposure type)	View **Exposure Type** Code List
Control Type	Control information for the reported effect may be presented in the text, in a graph, or in table format. ECOTOX does not make assessments whether the controls were satisfactory or insufficient (e.g., were replicates run, did control organisms die), but simply document whether the author(s) present information about the type of control that was used.	View **Control Type** Code List
Dose Number	The total number of exposure doses, including the control(s), for each independent test design is reported in this data field.	Numeric Value
Application Frequency	The frequency of dosing application is reported	View **Application Frequency** Code List

Soil Parameter Fields

Field Name	Field Definition	Field Type/ Additional Help
Soil Type	The scientific name of the natural soil or commercial name of the artificial soil used in the study. If the scientific name is not included, the type of soil is recorded using the author's terminology, e.g., forest soil, sandy loam soil, arboreal coniferous soil.	Text field
Soil Sand % Soil Silt % Soil Clay %	The soil texture as stated using percentages of sand, silt and/or clay. Bentonite, kaolinite or montmorillonite etc., are reported as clay.	Percent Value
Soil pH	The pH of the test media are reported. If the pH of the treated media is not presented, but the pH value is stated for the untreated or acclimation media, an asterisk (*) is denoted. If the pH of a specific soil type is not given in the publication, a search is made of the USDA/NRCS National Cooperative Soil Survey (USA) web site, at http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi may be found for the specific soil series.	pH value
Media Organic Matter	The media organic matter is recorded in measurement and units reported by the author. If organic matter is reported for the untreated or acclimation media, code this organic matter value in the same way as outlined previously and denote with an asterisk. If the organic matter of a specific soil type is not given in the publication, a search of the USDA/NRCS National Cooperative Soil Survey (USA) online site, at the following web address: http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi , can be conducted for the specific soil series.	View **Soil Organic Matter Unit** Code List
Media Moisture	The percentage of moisture in the test media is reported. If moisture is reported for the untreated or acclimation media, code this moisture percentage and denote it with an asterisk (*).	Percent Value
Media Cation Exchange Capacity	The media cation exchange capacity is reported. If the cation exchange capacity is reported for the untreated or acclimation media, this value is denoted with an asterisk.	

Field Name	Field Definition	Field Type/ Additional Help
Soil Dose Measured	The toxicant concentration was measured in the soil. However, the exposure dose value may or may not reflect the measured values. The Chemical Analysis Method field will denote if the exposure dose value is based on the measured values.	View **Soil Measured** Code List
Media Measurement (wet/dry)	Denotes whether the soil concentration was reported based on dry (D) or wet (W)weight basis.	View **Basis of Measurement** Code List

Terrestrial Exposure Dose Fields

Field Name	Field Definition	Field Type/ Additional Help
Exposure Sample Number	Sample number reflects the initial sample size for each exposure dose, i.e., the number of test organisms per treatment.	Numeric value
Gender	Identifies the initial sex (ML - Male, FM - Female, BH - Both)of the organism for each exposure level.	View **Gender** List
Chemical Analysis Method	The data field identifies whether nominal or quantified exposure dose values were reported by the author(s). For the specific exposure level, report whether toxicant and/or carrier concentration was measured (M) or calculated/nominal/unmeasured (U).	View **Chemical Analysis Method** Code List
Ionic Fraction	For ionizing substances (e.g., metals, ammonia), the dose is reported as the ion, if the concentration presented by the authors is reported as based on the ionic form of the compound (e.g., organotin as Sn). ECOTOX uses standard periodic table symbols.	View **Ionic Fraction** Code List
Dose Statistical Method	The method used to determine the range around the Dose value, if reported by the author(s). The codes standard deviation (SD) or standard error (SE), range (R), confidence interval (CI), confidence limits (CL), fiducial interval (FI) or fiducial limit (FL) of the dose value are noted.	View **Dose Statistical Method** Code List

Field Name	Field Definition	Field Type/ Additional Help
Concentration/Dose Value	The approximation (~), minus (-), greater than (>), or less than (<) symbols used by the author(s) or graphical data to describe the exposure dose.	View **Dose Unit** Code List

Terrestrial Result Fields

Field Name	Field Definition	Field Type/ Additional Help
Result Sample Number	The sample number reflects the sample size (e.g., 10 embryos) that the observation or response value is based on at each exposure level. Sample units correspond to the sample number; i.e., the unit on which the measurement or endpoint is based. For generational studies and measurements based on the progeny, F1, F2, etc. are noted in the sample units field.	View **Sample Unit** Code List
Observed Duration	The exposure duration when the result value was observed. This may be plus or minus any up to the time at which the response to the toxicant was observed. If the observation time is not reported or unable to be explicitly determined, a less than or equal to (<=) the exposure duration is displayed. Observations during the pretreatment time are reported as negative values. Report as '-x' any pretreatment response observations for which time is unknown.	View **Duration Unit** Code List
Effect Measurement	The specific effect measurement observed.	Browse Effects
Reviewer Assigned Endpoint	Used to identify the source of the effect or endpoint information is reported specifically by the author (P) or assigned by an ECOTOX reviewer (R). The reviewer only assigns the endpoint, if the author has provided the statistical analysis that to support the endpoint .	View **Review Assigned Endpoint** Code List
Response Site	A response site or tissue code is used to identify specific body, organ or tissue effect sites for associated effect measurement.	View **Response Site** Code List

Field Name	Field Definition	Field Type/ Additional Help
Significance	Statistical analysis as compared to the controls in the test result. Statistically significant (SIG) or not statistically significant (NSIG) codes are used.	
Level	The level of significance (e.g. test statistic) is coded when the author has reported statistical analysis in the test result. Terminology for significance level may be presented as: p =; p< or alpha value; χ^2. The terminology are equivalent and are generally in the range of 0.001 to 0.10.	Text Field
Observed Response	Response values may include greater than (>), less than (<), minus (-) or approximation (~)symbols, if used by the author(s). Response values must be numeric and from text or graph.	View **Observed Response Units** Code List
Result Statistical Method	When the measurement unit includes a standard deviation (SD) or standard error (SE), range (R), confidence interval (CI), confidence limits (CL), fiducial interval (FI) or fiducial limit (FL) of the response value are noted.	View **Result Statistical Method** Code List
Result % Dry/Wet Weight	If the effect measurement is based on dry (D)or wet (W) weight basis, it is denoted. The percent moisture is reported, record the percentage value also, e.g. W75%.	Percent value and/or code.
Result Percent Lipid	Percent lipid in the whole organism or response site	Percent value

REFERENCES

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